

## BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
Hoi-Ying N. Holman	Staff Scientist/Chemist

EDUCATION (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of California, Berkeley	Ph.D.	1986	Environ. Chem./Engi.
University of California Toxic Substances Research & Training Program	Postdoc	1988	Environmental Toxins

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Key personnel include the principal investigator and any other individuals who participate in the scientific development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the scientific development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

### RESEARCH AND/OR PROFESSIONAL EXPERIENCE

- 1995-present Principal Investigator; Staff Scientist/Chemist, LBNL. Utilize an interdisciplinary approach to develop real-time bioanalytical and imaging techniques for measuring at a molecular level the functions and structures of a living cells and tissues at a micron-size spatial resolution.
- 1996-1997 University of California Biotechnology Program Review Committee. Reviewed proposed research/teaching program which would benefit the development of biotechnology in California.
- 1990-1994 Staff Scientist/Chemist: Head of Environmental Measurement Lab; Group Leader of Analytical Organic Chemistry.
- 1989-1990 Scientist, LBNL. Established LBNL's Environmental Measurement Lab.

### Awards

- 1998 Lawrence Berkeley National Laboratory Outstanding Scientific Performance Award  
2005 Lawrence Berkeley National Laboratory Technology Transfer Award

### Patents and Patent Pending

1. Holman, H.-Y.N. and R. Miles. Virtual Window and Thin-Liquid-Film Apparatus for Continuous Fluorescence and Infrared Spectroscopy Imaging of Living Cells and Tissues, IB-2201, **2009**.
2. Holman, H.-Y. N. Spectroscopic evaluation of atherosclerotic plaques, IB-1867P, **2009**.
3. Holman, H.-Y. N. Gastrointestinal mimetic device, U.S. Patent No. 6,040,188, **2000**.

### SELECTED PUBLICATIONS

1. Holman, H.-Y.N., Wozei, E., Lin, Z., Comolli, L.R., Ball, D.A., Borglin, S., Field M.W., Hazen, T.C. and K.H. Downing. Real-time molecular monitoring of chemical environment in obligately anaerobes during oxygen adaptive response. *PNAS USA*, June 16th online, **2009**.
2. Tsibakashvili, N., Kalabegishvili, T., Rchenishvili A. V., Murusidze, I., Rchenishvili O.A., Kerkenjia, S.. Holman, H.-Y. N. Decomposition of Cr(V)-diols to Cr(III) complexes *A. oxydans*. *Microbial Ecology*, 57:360-366, **2009**.
3. Holman, H.-Y.N. Bjornstad, C., Rosenberg, C., Martin, M.C., McKinney, W.R., Blakely E.A., and F.G. Blankenberg, Mid-infrared reflectivity of Experimental Atheromas. *J. of Biomedical Optics*, 13, **2008**.
4. Tsibakashvili, N., Kalabegishvili, T., Mosulishvili,L., Kirkesali, E., Kerkenjia, S.. Murusidze, I., Holman, H.-Y. N., Frontasyeva, M.V., and S.F. Gundorina. Biotechnology of Cr(VI) transformation into Cr(III) complexes. *J. of Radioanalytical and Nuclear Chemistry*, 278(3), **2008**.
5. Yang, C., Cheng, Y., Ma, X., Zhu, Y., Holman, H.-Y.N., Zhang, L., and C. Wang. Surface mediated chromate-resistant mechanism of *Enterobacter cloacae* bacteria investigated by atomic force microscopy. *Langmuir*, 23(8), 4480-4485, **2007**.

6. Holman, H.-Y. N., and M.C. Martin. Synchrotron radiation infrared spectromicroscopy: a non-invasive molecular probe for biogeochemical processes. *Advances in Agronomy*, 90: 79-127, 2006.
7. R. Codd, P. Lay, N. Tsibakashvili, T. Kalabegishvili, I. Murusidze, H.-Y. N. Holman. Chromium(V) complexes generated in *Arthrobacter oxydans* by simulation analysis of EPR spectra. *J. Inorg. Biochem.* 100, 1827-1833, 2006.
8. Lin, Z., Zhu, Y., Kalabegishvili T.L., Tsibakashvili, N.Y., and H.-Y. N. Holman. Effect of chromate action on morphology of basalt-inhabiting bacteria. *Materials Science and Engineering C*. 26:610-612, 2006.
9. Woods, K.N., Lee, S.A., Holman, H.-Y. N., and J. Wiedemann. "The effect of solvent dynamics on the low frequency collective motions of DNA in solution and unoriented films", *J. Chemical Physics*, 124:224706-1 – 224706-8, 2006.
10. Mukhopadhyay A., He Z., Alm E.J., Arkin A.P., Baidoo E.E., Borglin S.C., Chen W., Hazen T.C., He Q., Holman H.-Y. N., Huang K., Huang R., Joyner D.C., Katz N., Keller M., Oeller P., Redding A., Sun J., Wall J., Wei1 J., Yen H.-C., Zhou J., and J. D. Keasling. Salt stress in Desulfovibrio vulgaris Hildenborough: An integrated genomics approach. *J. of Bacteriology*, 188(11): 4068-4018, 2006.
11. Tsibakashvili N.Y., Frontasyeva M.V., Kirkesali E.I., Aksanova N.G., Kalabegishvili, T.L., Murusidze I.G., Mosulishvili, L.M., H.-Y. N. Holman. Epithermal Neutron Activation Analysis of Cr(VI)-Reducer Basalt-Inhabiting Bacteria. *Analytical Chemistry*, 78(18), 6285-6290, 2006.
12. Wozei E., Hermanowicz S. W., and H.-Y. N. Holman. Developing a biosensor for estrogens in water samples: Study of the real-time response of live cells of the estrogen-sensitive yeast strain RMY/ER-ERE using fluorescence microscopy. *Biosensors & Bioelectronics*. 21(8): 1654-1658, 2006.
13. Monaselidze J., Abuladze M., Asatiani N., Kiziria E., Barbakadze S., Majagaladze G., Iobadze M., Tabatadze L., Holman H.-Y. N., and N. Sapojnikova. Characterization of chromium-induced apoptosis in cultured mammalian cells: A differential scanning calorimetry study. *Thermochimica Acta*. 441:8-15, 2006.
14. Stroo H.F., Nakles D.V., Kreitinger J. P., Loehr R.C., Hawthorn, S.B., Luthy, R.G., Holman H.-Y. N., and A. Lapierre. Improving Risk Assessments for Manufactured Gas Plant Soils by Measuring PAH Availability. *Integrated Environmental Assessment and Management*. 1( 3): 259–266, 2005.
15. Downing K.H., Sui H., Comolli L.R. and H.-Y.N. Holman. Electron Tomographic Studies of Bacterial Structure and Function. *Microscopy and Microanalysis*, 10(Suppl 2):1184-1185 Cambridge University Press, 2004.
16. Asatiani N.V., Abuladze MK., Kartvelishvili T.M., Bakradze N.G., Sapojnikova N.A., Tsibakashvili N.Y., Tabatadze L.V., Lejava L.V. Asanishvili L.L., Holman H.Y. Effect of Chromium(VI) action on *Arthrobacter oxydans*. [Article] *Current Microbiology*. 49(5):321-326, 2004.
17. Tsibakashvili N.Y., Mosulishvili L.M., Kalabegishvili T.L., Kirkesali E.I., Frontasyeva M.V., Pomyakushina E.V., Pavlov S.S., Holman H.-Y.N. ENAA studies of chromium uptake by *Arthrobacter oxydans*. *Journal of Radioanalytical & Nuclear Chemistry*. 259(3):527-531, 2004.
18. Asatiani N., Sapojnikova N., Abuladze M., Kartvelishvili T.L., Kulikov, N., Kiziria E., Namchevadz, E., and H.-Y. N. Holman. "Effects of Cr(VI) long-term and low-dose action on mammalian antioxidant enzymes: An *in vitro* study". *J. Inorganic Biochemistry*, 98, 490-496, 2004.
19. Kartvelishvili T, Abuladze M, Asatiani N, Akhvlediani J, Kiziria E, Asanishvili L, Lejava L, Holman H.-Y.N., Sapojnikova N. Estimation of the cellular antioxidant response to chromium action using ESR method. *ScientificWorldJournal*. Sep 2;4:785-794, 2004.
20. Kartvelishvili T, Abuladze M, Asatiani N, Akhvlediani J, Asanishvili L, Holman H.-Y.N., Sapojnikova N. Antioxidant capacity of cultured mammalian cells estimated by ESR method. *ScientificWorldJournal*. Jun 29;4:490-499, 2004.

21. Tsibakhashvili, N.Y., Mosulishvili, N.A., Kalabegishvili, T.L., Kirkesali, T.I., Frontasyeva, M.V., Pomyakushina, E.V., Pavlov, S.S., and H.-Y. N. Holman. "Epithermal neutron activation analysis (ENAA) studies of chromium uptake by *Arthrobacter oxydans*". *Journal of Radioanalytical and Nuclear Chemistry*, 259 (1/2), **2004**.
22. Holman, H.-Y. N., Martin, M.C. and W.R. McKinney. "Tracking chemical changes in a live cell: Biomedical Applications of SR-FTIR Spectromicroscopy", in *Special issue: First International Conference on Biomedical Spectroscopy: From Molecules to men*, *Spectroscopy - An International Journal*, 17(2-3), 139-160. **2003**.
23. Holman, H.-Y. N., Martin, M.C. and W. R. McKinney "Synchrotron-Based FTIR Spectromicroscopy: Cytotoxicity Considerations" *J. Biological Physics* 29, 275-286, **2003**.
24. Kalabegishvili, T.L, Tsibakhashvili, N.Y. and H.-Y. N. Holman. "Electron spin resonance study of chromium(V) formation and decomposition by basalt-inhabiting bacteria". *Environmental Science & Technology*, 37, 4678-4684, **2003**.
25. Bakradze, N., Sokhadze, V., Abuladze, M., Asatiani, N., Sapojnikova, N., Kartvelishvili, T.L., Tsibakhashvili, N.Y., Namchevadze, E., Tabatadze, L., Lejava, L., and H.-Y.N. Holman. "A Calorimetric Characterization of Cr(VI)-reducing Arthrobacter oxydans at different phases of the cell growth cycle". *TheScientificWorldJournal*, 3, 432-442, **2003**.
26. Holman, H.-Y. N., Bjornstad, K.A., McNamara, M.P., Martin, M.C., McKinney, W.R., and E.A. Blakely. "Synchrotron Infrared Spectromicroscopy as a Novel Bioanalytical Microprobe for Individual Living Cells: Cytotoxicity Considerations". Selected as an important article of Frontier Research and published by *Virtual Journal of Biological Physics Research* at <http://www.vjbio.org>. 8(1), **2002**.
27. Holman, H.-Y. N., Bjornstad, K.A., McNamara, M.P., Martin, M.C., McKinney, W.R., and E.A. Blakely. "Synchrotron Infrared Spectromicroscopy as a Novel Bioanalytical Microprobe for Individual Living Cells: Cytotoxicity Considerations". *J. of Biomedical Optics*, 7(3), 417-424, **2002**.
28. Holman, H.-Y. N., Nieman, K., Sorensen, D.L., Miller, C.D., Martin, M.C.; Borch, T., McKinney, W.R., and R.C. Sims. "Catalysis of PAH Biodegradation by Humic Acid Shown in Synchrotron Infrared Studies". *Environmental Science & Technology*, 36(6): 1276-1280, **2002**.
29. Holman, H.-Y. N., Goth-Goldstein, R., David Aston, Mao, Y., and J. Kengsoontra "Evaluation of gastrointestinal solubilization of petroleum hydrocarbon residues in soil using an *in vitro* Physiologically-Based Model". *Environmental Science & Technology*, 36(6):1281-1286, **2002**.
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31. Tsibakhashvili, N.Y., Asatiani, N.V., Abuladze, M.K., Birkaya, B.G., Sapojnikova, N.A., Mosulishvili, L.M., and H.-Y. N. Holman. "Capillary Electrophoresis of Cr(VI) Reducer *Arthrobacter oxydans*". *Biomedical Chromatography*, 16(5): 327-331, **2002**.
32. Bhupathiraju, V. K., Krauter, P., Holman, H-Y. N., Conrad, M. E., Daley, P. F., Templeton, A. S., Hunt, J. R., Hernandez, M., and L. Alvarez-Cohen. "Assessment of in-situ bioremediation at a refinery waste-contaminated site and an aviation gasoline contaminated site". *Biodegradation*, 13(2):79-90, **2002**.
33. Abuladze, M.K., Asatiani, N.V., Bakradze, N. G., Kartvelishvili, T.M., Holman, H.-Y. N., Kalabegishvili, T.L., Mosulishvili, L.M., Rcheulishvili, A.N., Sapojnikova, N.A., and N. Y. Tsibakhashvili. "Effect of Chromium Action on the Protein Composition of *A. oxydans*" *Fresenius of Environmental Bulletin*, 11(9A): 562-567, **2002**.
34. Tsibakhashvili N.Y., Mosulishvili, L.M., Kalabegishvili, T.L., Pataraya, D.T., Gurieldze, M.A., and G.S. Nadareishvili, and H.-Y. N. Holman. "Chromate-Resistant and -Reducing Microorganisms in Georgia Basalts: Their Distribution and Characterization". *Fresenius of Environmental Bulletin*, 11(10), 352-361, **2002**.
35. Holman, H.-Y. N., Goth-Goldstein, R., Martin, M.C., Russell, M.L., and W.R. McKinney. "Low-dose responses to 2,3,7,8-tetrachlorodibenzo-p-dioxin in single living human cells measured by synchrotron infrared spectromicroscopy," *Environ. Sci. & Tech.*, 34 (12), 2513-2517, **2000**.

36. Holman, H.-Y. N., Martin, M.C., Blakely, E.A., Bjornstad, K., and W.R. McKinney. "Infrared spectroscopic characteristics of cell cycle and cell death probed by synchrotron-based FTIR spectromicroscopy," *Biopolymers: Biospectroscopy*, 57[6], 329-335, **2000**.
37. Holman, H.-Y. N., Goth-Goldstein, R., Blakely, E.A., Bjornstad, K., Martin, M.C., and W.R. McKinney. "Individual Human Cell Responses to Low Doses of Chemicals Studied by Synchrotron Infrared Spectromicroscopy", in *Biomedical Spectroscopy: Vibrational Spectroscopy and Other Novel Techniques*, SPIE Vol. 3918, 57-63, **2000**.
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39. Holman, H.-Y. N., Perry, D.L., Martin, M.C., Geraldine Lamble, W.R. McKinney, and J.C. Hunter-Cevera. "Real-time Characterization of Biogeochemical Reduction of Cr(VI) on Basalt Surfaces by SR-FTIR Imaging," *Geomicrobiology J.*, 16(4), 307-323, **1999**.
40. Holman, H.-Y. N., Tsang, Y.W., and W.R. Holman. Mineralization of sparsely water-soluble polycyclic aromatic hydrocarbons in a water table fluctuation zone. *Environ. Sci. Technol.*, 33, 1819-1824, **1999**.
41. Holman, H.-Y.N., Zhang, M., Goth-Goldstein R., Martin, M.C., Russell, M., McKinney W.R., Ferrari, M., and J.C. Hunter-Cevera. "Detecting exposure to environmental organic toxins in individual cells: towards development of a micro-fabricated device," *Micro-Nanofabricated Structures and Devices for Biomedical Environmental Applications II*, SPIE, 3606, 55-62, **1999**.
42. Zhang, M., Holman, H.-Y. N., Ferrari, M., and J.C. Hunter-Cevera. "Synchrotron infrared microspectroscopy for assessment of mutagenicity of metal implants," *Biomedical Materials - Drug Delivery, Implants and Tissue Engineering, MRS Symp. Series*, 163-169, **1999**.
43. Holman, H.-Y. N., Perry, D.L., and J.C. Hunter-Cevera. Surface-enhanced infrared absorption-reflectance (SEIRA) microspectroscopy – a chemical/biological probe for bacteria localization in geologic materials. *J. Microbiol. Methods*, 34/1, 59-71, **1998**.
44. Holman, H.-Y. N., Perry, D.L., Martin, M.C., and W.R. McKinney. Applications of synchrotron infrared microspectroscopy to the study of inorganic-organic interactions at the bacterial-mineral interface, *Application of Synchrotron Radiation Techniques to Materials Sciences, MRS Symp. Series*, 17-24, **1998**.
45. Holman, H.-Y. N., and I. Javandel. Evaluation of transient dissolution of slightly water-soluble compounds from a light nonaqueous phase liquid pool, *Water Resources Research*, 32, 915-923, **1996**.
46. Holman, H.-Y. N., and Y.W. Tsang. Effects of soil moisture on biodegradation of petroleum hydrocarbons. In: *In situ aeration: air sparging, bioventing and related remediation processes*, Battelle Press, Richland. 323-332, **1995**.
47. Javandel, I., Falta, R.W., and H.-Y.N. Holman. Recent developments in transport and fate of non-aqueous phase liquids in the subsurface environment, *Iran. J. of Sci. and Technol.*, 14, 269, **1990**.